

ALARM CALL OF THE PYGMY RABBIT (*BRACHYLAGUS IDAHOENSIS*)¹

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ABSTRACT.— An alarm vocalization was identified in the pygmy rabbit. The call was composed of from one to seven syllables uttered in rapid succession. The syllables were complex tones with many overlying frequencies; the strongest occurred close to harmonic intervals at 4000 and 6000 Hz. In both laboratory and field conditions, the call seemed to be elicited by a potential predator and its use may be unique among leporids.

Squeals or distress calls reportedly were made by several leporids including the brush rabbit (*Sylvilagus bachmani*) (Chapman and Verts 1969), the New England cottontail (*S. transitionalis*) (Olmstead 1970), the desert cottontail (*S. audubonii*) (Orr 1940 and Ingles 1941), and the eastern cottontail (*S. floridanus*) (Marsden and Holler 1964). These calls generally were given by wounded rabbits or in response to human handling. In addition, Marsden and Holler (1964) identified an "alert call" given in response to danger by swamp rabbits (*S. aquaticus*) in a confined population. We describe an alarm vocalization given by the pygmy rabbit (*Brachylagus idahoensis*) (Green and Flinders 1980a).

Alarm signals given by *Lepus* spp. (Kingdom 1974), the European rabbit (*Oryctolagus cuniculus*) (Mykytowycz 1968), and the desert cottontail (Orr 1940) usually were made by thumping the ground with the hind feet. Alarm spread quickly among jackrabbits (*L. californicus*) when one of them sat up with ears erect (Lechleitner 1958). The desert cottontail also used its tail as an alarm signal (Chapman and Willner 1978). When the tail was raised showing maximum white, conspecifics fled to cover.

The pygmy rabbit lacks white flagging on the ventral surface of the tail and may have developed a different strategy to signal alarm. At the U.S. Sheep Experiment Station in southeastern Idaho, these rabbits selected dense brushy habitat (Green and Flinders 1980b), where visual signals of alarm would not be as functional as a vocalization.

Alarm calls given by three caged pygmy rabbits as they were frightened into their den box were recorded at 19 cm/sec (range 40–20,000 Hz) with a Uher 4000-L tape recorder and a Uher M 517 microphone mounted in a 60-cm-diameter parabolic reflector. Recordings were analyzed with a Uher 4000-L recorder and a Kay 6061B Sona-graph Spectrum Analyzer (range 85–16,000 Hz) with a narrow band (20Hz) filter. (Mention of a trade name, proprietary product, or specific equipment does not constitute a guarantee or warranty by the U.S. Department of Agriculture and does not imply its approval to the exclusion of other products that may be suitable.)

Seven recorded alarm vocalizations, three single, and four double syllables (two with squeaks) from an adult male rabbit were analyzed. All syllables were similar; the strongest fundamental frequency was about 1350 Hz and lasted about 0.1 sec (range 0.09–0.12 sec). The mean elapsed time between the double syllables was 0.32 sec (range 0.28–0.39 sec). The syllables were complex tones with many overlying frequencies; the strongest occurred close to harmonic intervals at 4000 and 6000 Hz (Fig. 1) and extended above the 16,000 Hz limit of the sonagraph. The vocal pattern of each syllable differed but often contained a rapid rise and fall, producing a "blip." The squeaks at the end of two double-syllable calls were of short duration (0.04 sec) at a frequency of about 1460 Hz. Elapsed time between final syllables and squeaks was 0.90 sec each.

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The alarm call was composed of from one to seven syllables (usually one or two) uttered in rapid succession often followed by one to several squeaks. It was heard numerous times in natural habitat of pygmy rabbits during all seasons of the year. Generally, the call was given by a rabbit as it retreated into a burrow. Calling often continued for several seconds within the burrow and could be heard by an observer 15 m away. Rabbits that waited until they were in burrows to vocalize would be less vulnerable to common predators in the area, coyotes (*Canis latrans*) and red fox (*Vulpes vulpes*), but would increase their inclusive fitness (Dunford 1977). One rabbit gave the call while it stood in an erect, alert position near a burrow entrance; when approached by an observer, it entered the burrow and gave the call again. Another, confined in a live trap, called repeatedly as an observer approached.

Janson (1946:75) noted: "Like other rabbits, the pygmy has a loud quavering squeal when captured. In addition, he sometimes utters a call somewhat resembling that of a pika, but much fainter. When pursued

closely, it often utters a faint squeak of fright." Wilde (1978) also noted the first two of these calls. The distress cry of pygmy rabbits (the loud quavering squeal described by Janson, 1946) occurred when they were removed from wire traps and particularly when they were snared (Green and Flinders 1979). We presume that the "squeak of fright" (Janson 1946) may be a faint distress cry or a part of the alarm call. Rabbits occasionally squeaked after they entered a burrow or den box, but the behavioral significance of this is unknown. The pikalike call (Janson 1946) we assume to be the alarm call similar to the alert call described by Marsden and Holler (1964) for confined swamp rabbits.

In cages, both male and female pygmy rabbits frequently gave alarm vocalizations. Males were perhaps more vocal than females, and certain males regularly emitted the alarm call as they dashed to their den box. In both laboratory and field conditions, the call seemed to be elicited by a potential predator. Alarm calls given by marmots (*Marmota caligata*) (Taulman 1977), ground squirrels (*Spermophilus tereticaudus*) (Dunford 1977),

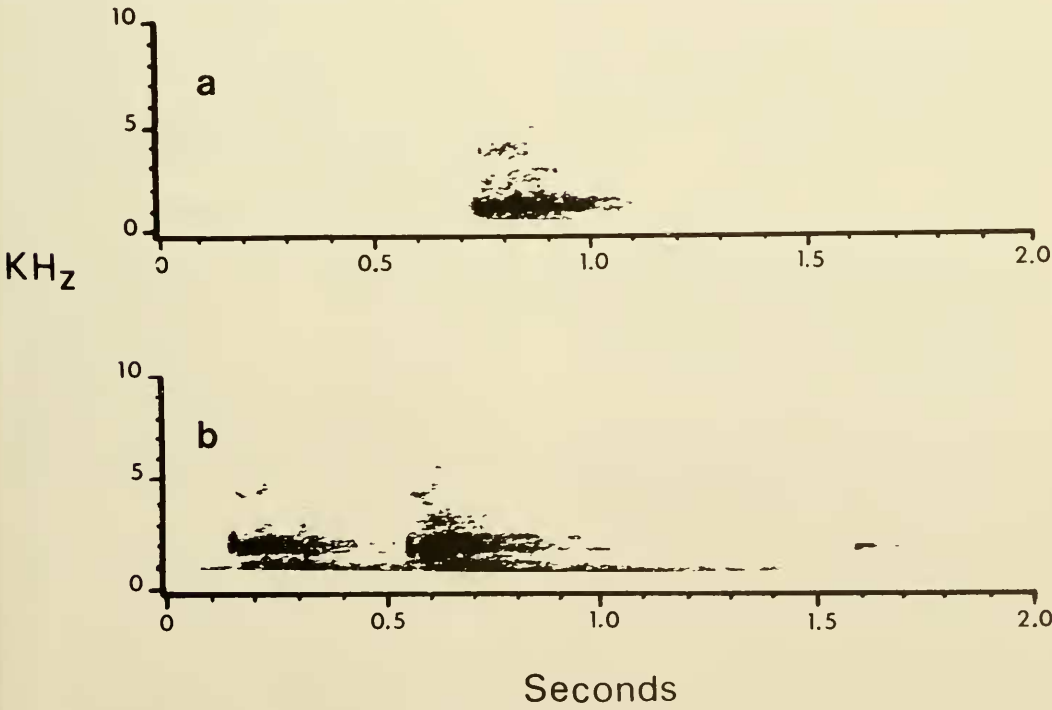


Fig. 1. Sonagraph of a postulated alarm vocalization from the pygmy rabbit: (a) single syllable and (b) double syllable ending with a squeak.

prairie dogs (*Cynomys ludovicianus*) (Smith et al. 1977), and pikas (*Ochotona princeps*) (Lutton 1975) were elicited in similar situations (also see Harvey and Greenwood 1978).

A low chucklelike call occasionally was emitted when a pygmy rabbit was touched while in a trap or cage. A hand-raised female pygmy rabbit emitted the chuckle when disturbed in her box. The chuckle seemed to be a protest to the violation of individual distance and may have corresponded to the grunt in *Lepus* (Lechleitner 1958). Some pygmy rabbits emitted soft barks while entering or leaving their den boxes when there was no discernible cause for alarm.

To our knowledge, alarm calling in leporids under natural conditions has not been reported. The adaptive advantages of giving alarm calls would be greatest in social settings where the likelihood of closely related individuals responding by flight would be increased (Dunford 1977). Pygmy rabbits are associated with sagebrush (*Artemisia* spp.) habitat (Orr 1940) and are generally aggregated (Green and Flinders 1980b). Janson (1946) reported estimates of density for pygmy rabbits based on burrow counts of 0.7 and flush transects of 1.4 rabbits per ha. We found densities of 45 rabbits per ha. It is reasonable to conclude that alarm calls could be selected for this aggregated species living in a habitat with poor visibility.

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